

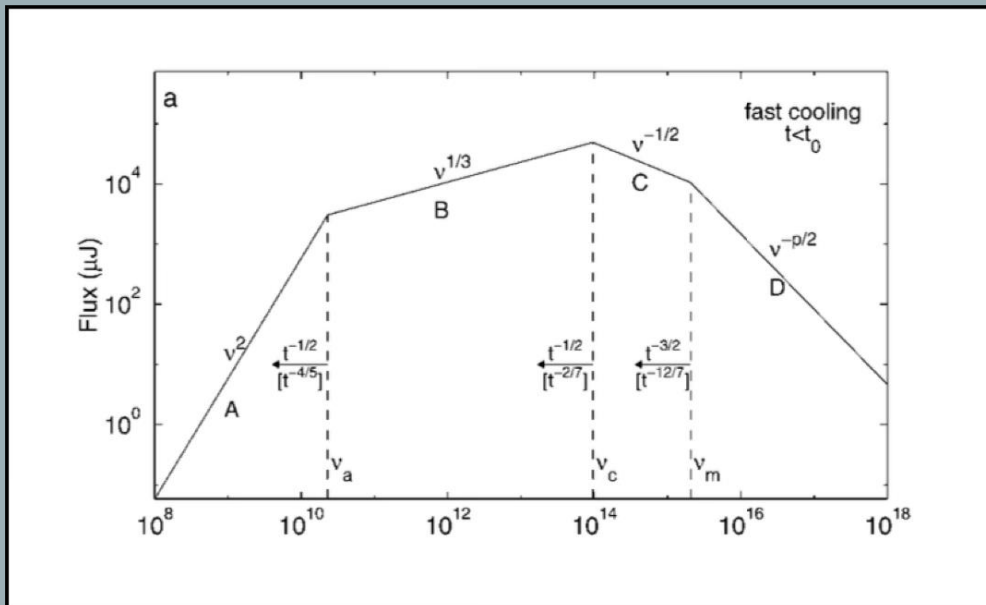
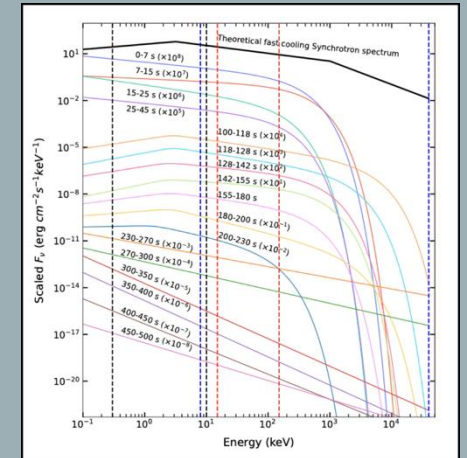
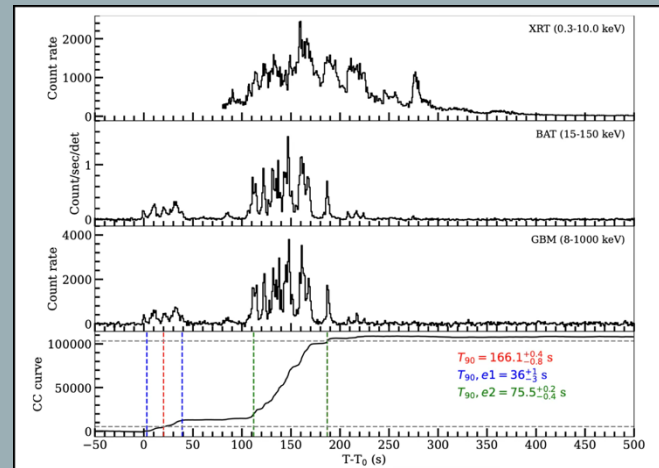
# FAST-COOLING SYNCHROTRON PROMPT EMISSION FROM INTERNAL SHOCKS IN GRB 241030A

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Synchrotron Radiation in relativistic Shocks:

$$F_\nu = \begin{cases} (\nu/\nu_c)^{1/3} F_{\nu,\max}, & \nu_c > \nu, \\ (\nu/\nu_c)^{-1/2} F_{\nu,\max}, & \nu_m > \nu > \nu_c, \\ (\nu_m/\nu_c)^{-1/2} (\nu/\nu_m)^{-p/2} F_{\nu,\max}, & \nu > \nu_m, \end{cases}$$

GRB 241030A :



Magnetically dominated outflows with decaying field :

$$\nu_m \simeq \frac{3q_e}{4\pi m_e c} \Gamma B_{\text{eff}} \gamma_m^2$$

$$\nu_c \propto \Gamma B_{\text{eff}}^{-3} (\Delta t')^{-2}$$

Does not match with observations

Matter dominated Internal shock scenario:

$$\gamma_{\text{rel}} \approx \frac{1}{2} \left( \frac{\gamma_f}{\gamma_s} + \frac{\gamma_s}{\gamma_f} \right)$$

$$\nu_m \propto B' \gamma_m^2 \propto R^{-1} (\gamma_{\text{rel}} - 1)^{5/2} \gamma_{\text{rel}}^{1/2} (\epsilon_e/\xi)^2 \epsilon_B^{1/2}$$

$$\nu_c \propto (B'^3 \delta t^2)^{-1} \propto R^3 \delta t^{-2} [(\gamma_{\text{rel}} - 1) \gamma_{\text{rel}}]^{-3/2} \epsilon_B^{-3/2}$$

Matches with the observational trend